WHAT WE CLAIM IS：

1. A method of making a transparent panel-form loudspeaker including a rectangular transparent panel with length a and width b under the condition that b is less than or equal to a to be capable of sustaining flexural vibration over the area of the panel, said method including steps of:

(a) analyzing the distributions of the modal parameters, which include natural frequencies, modal amplitudes, mode shapes and phase angles, in the modal analysis of said transparent panel which is driven by a preselected number of transducers to generate flexural vibration of said panel and supported peripherally by a flexible suspension device consisting of a continuous corrugated cloth type support and several discrete supports, said modal parameters varying according to values of the design parameters of said transparent panel-form loudspeaker including the ratio of elastic modulus to density of the material used to fabricate said transparent panel, the ratio of length to thickness of said panel, locations of said transducers and said discrete supports on the peripheral edge of said transparent panel;

(b) analyzing a sound pressure level spectrum generated by said transparent panel-form loudspeaker, said sound pressure level spectrum also varying according to values of said design parameters of said panel-form loudspeaker;

(c) identifying the favourable modal parameters which are beneficial to sound radiation and the unfavourable modal parameters which have adverse effects on sound radiation;

(d) selecting values of said design parameters resulting in

suppressing the adverse effects of the unfavourable modal parameters, magnifying the beneficial effects of the favourable modal parameters, and achieving a desired sound pressure level spectrum over a specific frequency range; and

(e) making said transparent panel of said panel-form loudspeaker with said selected values of said design parameters.

2. The method of claim 1 wherein said design parameters of the transparent panel-form loudspeaker are selected via a two-level optimization approach in which the ratios of elastic modulus to density and length to thickness of the transparent panel are selected to maximize the sound pressure levels at some specific frequencies for the transparent panel-form loudspeaker at the first level of optimization while the locations of said transducers and said discrete supports of the flexible suspension device on the peripheral edge of the transparent panel are selected to make the panel-form loudspeaker to produce a more uniform distribution of sound pressure level in a specific frequency range at the second level of optimization.

3. The method according to claim 2 wherein said transparent panel used in fabricating the transparent panel-form loudspeaker are selected to have said ratio of elastic modulus to density greater than 80 and less than 180 $GPa/\left(g/cm^3\right)$ and said ratio of length to thickness greater than 80 and less than 600.

4. The method according to claim 2 wherein said transducers are located at points with distances greater than one tenth of the lengths of the edges on which the transducers are mounted away from the ends of the edges and the distances between the supporting points of said discrete supports and said transducers are greater than one tenth

of the length of the edge on which both said supporting points and transducers are situated.

5. A transparent panel-form loudspeaker for producing sound in response to varying audio signals, comprising:

   (a) a rectangular transparent panel with length a and width b, said width b being less than or equal to said length a;

   (b) at least one transducer mounted on the peripheral edge of said transparent panel for generating flexural vibration of said panel;

   (c) a flexible suspension device used to support the peripheral edge of said transparent panel; and

   (d) a rectangular frame used to support said flexible suspension device.

6. The transparent panel-form loudspeaker of claim 5 wherein said transparent panel having the ratio of length to thickness in the range from 80 to 600 is made of materials selected from a group of transparent materials consisting of glass, PMMA, PVC, PS, PC, and PET of which the ratio of elastic modulus to density is greater than 80 and less than 180 $GPa/(g/cm^3)$.

7. The transparent panel-form loudspeaker of claim 5 wherein the locations of said transducers, which are one of round-shaped electrodynamic transducers of cylindrical moving-coil type and blade-like electrodynamic transducers of flate moving-coil type, on the peripheral edge of the transparent panel are determined using said method in accordance with claim 1 to achieve said desired spectrum of sound pressure level over said specific frequency range.

8. The transparent panel-form loudspeaker of claim 5 wherein said flexible suspension device consists of a continuous soft plastic-impregnated corrugated cloth type used to damp out standing

waves at the peripheral edge of said transparent panel and several discrete flexible supports, which are one of foam-plastic pads and tension wires, used to adjust the stiffness and distributions of the modal parameters of said transparent panel.

9. The transparent panel-form loudspeaker of claim 5 wherein the number of discrete flexible supports on any edge of said transparent panel is less than ten and the locations of the supporting points of said discrete flexible supports of said flexible suspension device on the peripheral edge of said transparent panel are determined using said method in accordance with claim 1 to achieve said desired spectrum of sound pressure level over said specific frequency range.

10. The transparent panel-form loudspeaker of claim 7 wherein said blade-like transducer comprising:

(a) a pair of parallel magnetic units in which there is a gap in-between the two units and each unit is fabricated by sandwiching a bar-like permanent magnet in-between two face pole plates used to channel the flow of magnetic flux from one magnetic unit to another so that a close loop of magnetic flow can be formed;

(b) a flate type voice coil consisting of a long hollow rectangular coil of which the upper and lower sides of the rectangular coil are immersed in the magnetic fields formed by the upper and lower face pole plates, respectively and a top flange used to adhesively bind the voice coil to the edge of said transparent panel; and

(c) a flexible suspension device used to position the voice coil in the gap between the two magnetic units.

11. The transparent panel-form loudspeaker of claim 7 wherein said flat voice coil of said blade-like transducer is one of printed circuit type

and wire winding type voice coil.

12. The transparent panel-form loudspeaker according to claim 8 wherein said transparent panel-form loudspeaker is installed in front of the screen of a CRT monitor via the use of several hooks and adhesive foam-plastic pads which are placed in-between the frames of said panel-form loudspeaker and said CRT monitor to prevent said panel-form loudspeaker from rocking and damp out the vibration generated by said panel-form loudspeaker.

13. The transparent panel-form loudspeaker according to claim 7 wherein said transparent panel-form loudspeaker is installed in front of the screen of a television set via the use of several hooks and adhesive foam-plastic pads which are placed in-between the frames of said panel-form loudspeaker and said television set to prevent said panel-form loudspeaker from rocking and damp out the vibration generated by said panel-form loudspeaker.

14. The transparent panel-form loudspeaker according to claim 7 wherein said transparent panel-form loudspeaker is installed in front of a projection screen via the use of several hooks and adhesive foam-plastic pads which are placed in-between the frames of said panel-form loudspeaker and said projection screen to prevent said panel-form loudspeaker from rocking and damp out the vibration generated by said panel-form loudspeaker.

15. The transparent panel-form loudspeaker according to claim 7 wherein said transparent panel-form loudspeaker is installed in front of the LCD screen of a cellular phone via one of the two approaches in which the frame of said transparent panel-form loudspeaker is adhesively bound to the outer surface of the frame of said cellular phone and the flexible suspension device of said transparent

panel-form loudspeaker is mounted on the inner surface of the frame of said cellular phone.

16. The transparent panel-form loudspeaker according to claim 7 wherein said transparent panel-form loudspeaker is installed in front of the screen of a video intercom via the use of several hooks and adhesive foam-plastic pads which are placed in-between the frames of said panel-form loudspeaker and said video intercom to prevent said panel-form loudspeaker from rocking and damp out the vibration generated by said panel-form loudspeaker.

17. The transparent panel-form loudspeaker according to claim 7 wherein said transparent panel-form loudspeaker is installed in front of the LCD screen of a video camera via one of the two approaches in which the frame of said transparent panel-form loudspeaker is adhesively bound to the outer surface of the frame of the LCD screen of said video camera and the flexible suspension device of said transparent panel-form loudspeaker is mounted on the inner surface of the frame of the LCD screen of said video camera.

18. The transparent panel-form loudspeaker according to claim 7 wherein said transparent panel-form loudspeaker is installed in front of the LCD screen of a personal digital assistant (PDA) via one of the two approaches in which the frame of said transparent panel-form loudspeaker is adhesively bound to the outer surface of the frame of the LCD screen of said PDA and the flexible suspension device of said transparent panel-form loudspeaker is mounted on the inner surface of the frame of the LCD screen of said PDA.